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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/590,383	08/23/2006	Hiroshi Hasegawa	060619	6985

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EXAMINER	
DAVIS, MARY ALICE	
ART UNIT	**PAPER NUMBER**
3748	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/590,383	HASEGAWA ET AL.	
	Examiner	Art Unit	
	MARY A. DAVIS	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 June 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *24-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *24-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 August 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *8/23/06; 12/18/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The following title is suggested: EXPANDER WITH DISCHARGE VALVE.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 24-26 and 28-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over HATTORI ET AL (U.S. Patent 5,775,883) in view of HASEGAWA ET AL (World Intellectual Organization Publication Number WO 03/089766 A1) (English patent family U.S. Patent Publication US 2005/0158199 A1).

Regarding claim 24, HATTORI ET AL discloses:

- An expander comprising a cylinder (13, 15), a shaft (19) having an eccentric portion (19c), a roller (31, 33) which is fitted to said eccentric portion (see Figures 1, 8, and 25) and which eccentrically rotates inside said cylinder (see Figures 2-3, 9-10, 24, and 26-27), a closing member ((21) and (17) for cylinder (13), and (17) and (23) for cylinder (15)) for closing both end surfaces of said cylinder (see Figures 1, 8, and 25), a vane (37) for partitioning a space formed by said cylinder (see Figures 2-3, 9-10, 24, and 26-27), said roller and said

closing member into a plurality of working chambers (see Figures 1-3, 8-10, and 24-27), a suction hole (49) through which working fluid flows into said working chamber (Column 4, lines 32-41), and a discharge hole (55) through which the working fluid is discharged from said working chamber into a discharge space (57) (Column 4, lines 51-58).

Regarding claims 30 and 37-39, HATTORI ET AL discloses:

- a shaft of said expander (19) is directly connected to a shaft (63) of a compressor (see Figures 1, 8, and 25; Column 4, lines 61-67).

However, HATTORI ET AL fails to disclose the discharge hole having a differential pressure regulating valve which is operated by a difference between pressure in said working chamber and pressure in said discharge space.

Regarding claim 24, HASEGAWA ET AL teaches:

- said discharge hole (48, 49) is provided with a differential pressure regulating valve (30a, 30b, 51a, 51b, 52a, 52b) which is operated by a difference between pressure in said working chamber and pressure in said discharge space (the valve is shown in Figures 1 and 3 to be between the working chamber (25, 45) and the discharge space (33), see Abstract).

Regarding claim 25, HASEGAWA ET AL teaches:

- said differential pressure regulating valve is closed when the pressure in said working chamber is lower than the pressure in said discharge space (see Figures 1 and 3, and Abstract).

Regarding claim 26, HASEGAWA ET AL teaches:

- said differential pressure regulating valve is a reed valve (see Figures 1 and 3).

Regarding claims 28 and 31-33, HASEGAWA ET AL teaches:

- fluid which expands from liquid phase or supercritical phase to gas-liquid two-phase is used as the working fluid (see Figure 2) (See U.S. Patent Publication US 2005/0158199 A1, Page 2, ¶0016, and Page 5, ¶0044) (the expanders of HATTORI ET AL and HASEGAWA ET AL are capable of expanding the fluid from one phase to another).

Regarding claims 29 and 34-36, HASEGAWA ET AL teaches:

- the expander is utilized in a heat pump cycle which uses carbon dioxide as the working fluid (See U.S. Patent Publication US 2005/0158199 A1, Page 2, ¶0017) (the expanders of HATTORI ET AL and HASEGAWA ET AL are capable of using carbon dioxide as a working fluid).

It would have been obvious to a person having ordinary skill in the art at the time of the invention was made to have the discharge hole have a differential pressure regulating valve which is operated by a difference between pressure in said working chamber and pressure in said discharge space in the expander of HATTORI ET AL, in order to improve the efficiency of the expander by preventing incomplete expansion losses and overexpansion losses (see Abstract).

4. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over the modified expander of HATTORI ET AL as applied to claim 25 above, and further in view of KOUNO ET AL (U.S. Patent Publication US 2002/0012595).

The modified expander of HATTORI ET AL discloses the claimed invention as discussed above including the differential pressure regulating valve being a reed valve, however, fails to disclose the differential pressure regulating valve having a circular conical valve portion.

KOUNO ET AL teaches a differential pressure regulating valve having a circular conical valve portion (see Figures 2-3).

It would have been obvious to a person having ordinary skill in the art at the time of the invention was made to have the differential pressure regulating valve have a circular conical valve portion instead of being a reed valve in the modified expander of HATTORI ET AL, in order to improve the efficiency (see Figures 11-12). Furthermore, it would have been obvious to a person having ordinary skill in the art at the time of the invention was made to have the differential pressure regulating valve have a circular conical valve portion instead of being a reed valve in the modified expander of HATTORI ET AL, since a simple substitution of one known element for another known element requires only routine skill in the art.

Communication

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARY A. DAVIS whose telephone number is (571)272-9965. The examiner can normally be reached on Monday thru Thursday; 6:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Denion can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Thomas E. Denion/
Supervisory Patent Examiner, Art Unit 3748

/Mary A Davis/
Examiner, Art Unit 3748